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10CV/EV33

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Strength of Materials

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Draw a neat sketch of stress-strain curve for mild steel specimen in tension. Mark the salient points on it. **(05 Marks)**

b. Derive the relationship between Young's modulus, and bulk modulus of a material. **(05 Marks)**

c. A 1.5 m long steel bar having uniform diameter of 40 mm for a length of 1 m and in the next 0.5 m its diameter gradually reduces to 20 mm. Determine the elongation of the bar when subjected to an axial tensile load of 160 kN. Take E = 200 GPa. **(10 Marks)**

2 a. A concrete column is of square section with 250 mm size and is reinforced with 08 steel bars of 16 mm diameter. The member supports an axial load of 270 kN. Evaluate the stresses in steel and concrete assuming a modular ratio as 18. **(08 Marks)**

b. A flat bar of alluminium alloy 24 mm wide and 6 mm thick is placed between steel bars each 24 mm wide and 9 mm thick to form a composite bar (24 × 24) mm as shown in Fig. 2(b). The three bars are fastened together at their ends when the temperature is 10°C. Find the stresses in each of the material when the temperature of the whole assembly is raised to 50°C. If at the new temperature a compressive load of 20 kN is applied to the composite bar, what are the final stresses in steel and alluminium? Take $E_s = 2 \times 10^5$ N/mm^2, $E_a = 2/3 \times 10^5$ N/mm^2, $\alpha_s = 1.2 \times 10^{-5}$ per degree C : $\alpha_a = 2.3 \times 10^{-5}$ per degree C. **(12 Marks)**

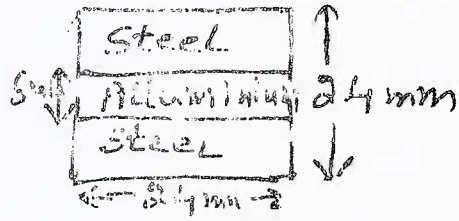

Fig. Q 2(b)

3 a. Define principal stresses and principal planes. **(03 Marks)**

b. A rectangular block of a material is subjected to tensile stresses of 120 N/mm^2 and 60 N/mm^2 on mutually perpendicular planes together with a shear stress of 70 N/mm^2. Find : i) The principal stresses ii) The principal planes iii) The maximum shear stress. Verify the results by constructing Mohr's circle. **(12 Marks)**

c. The stresses acting in a strained material is as shown in Fig. 3(c). Find the normal and tangential stress acting on a plane AB. **(05 Marks)**

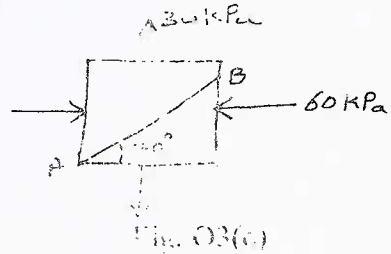

Fig. Q3(c)

4 a. Derive the relationship between intensity of load, shear force and bending moment. **(05 Marks)**

b. Show that the maximum bending moment in a beam subjected to udl throughout is $w\ell^2/8$, with usual notations. **(05 Marks)**

c. For the beam shown in Fig. 4(c). draw shear force and bending moment diagram. Mark the values at salient points. **(10 Marks)**

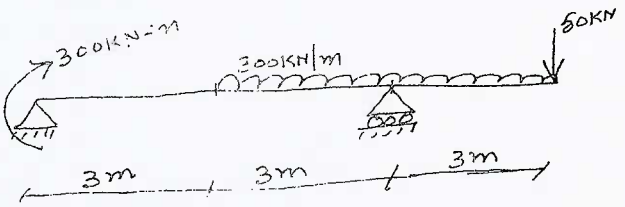

Fig. Q4(c)

PART – B

5 a. Explain the term "beam of uniform strength" with the help of neat sketches. **(03 Marks)**

b. Define : i) Neutral axis ii) Section modulus
iii) Flexural rigidity iv) Modulus of rupture. **(06 Marks)**

c. A rolled steel joist of I section used as a simply supported beam has the following dimensions : flange – (250 × 25)mm. web – 15 mm thick, overall depth – 50 mm. If this beam carries a udl of 50 kN/m on a span of 4m, calculate maximum stress produced due to bending. **(11 Marks)**

6 a. Determine the slope and deflection for a cantilever beam subjected to clockwise moment at its free end. **(08 Marks)**

b. Determine the deflection at B and D for the beam shown in Fig. Q6(b). Take E = 210 GPa and I = 1.6×10^7 mm^4. **(12 Marks)**

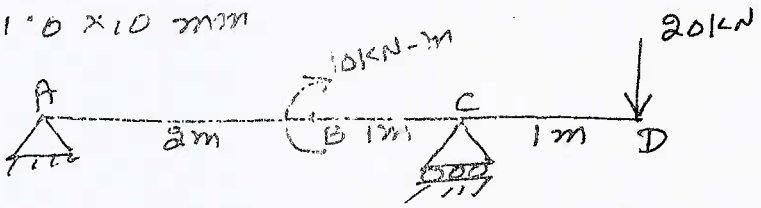

Fig. Q6(b)

7 a. Derive the expression for the theory of pure torsion, with usual notations. **(08 Marks)**

b. A solid circular shaft has to transmit power of 1000 KW at 120 rpm. Find the dia of the shaft if the shear stress must not exceed 30 N/mm^2. Maximum torque is 1.25 times the mean, what percentage in material could be obtained if the shaft is replaced by a hollow one, whose internal dia is 0.6 times the external dia. The length of material and maximum shear stress being same. **(12 Marks)**

8 a. Write short notes on limitations of Euler's formula. **(05 Marks)**

b. Define buckling load and slenderness ratio. **(03 Marks)**

c. Compare the crippling loads given by Euler's and Rankinn's formula for a tubular steel column 2.5 m long having outer and inner dia as 40 mm and 30 mm respectively loaded through pin jointed ends. Take yield stress = 320 N/mm^2, a = 1/7500 and E = 210 GPa. For what length of the column this cross section the Euler's formula cease to apply? **(12 Marks)**

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10CV35

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Fluid Mechanics

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. Assume missing data, if any, suitably.

PART – A

1 a. State and prove Newton's law of viscosity. **(04 Marks)**

b. The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 metre per sec requires a force of 98.1 N to maintain the speed. Determine i) the dynamic viscosity of the oil in poise and ii) the kinematic viscosity of the oil in stokes if the specific gravity of oil is 0.95. **(06 Marks)**

c. Define capillarity and derive an expression for capillary rise. **(05 Marks)**

d. Calculate the capillary effect in mm in a glass tube of 4 mm diameter, when immersed in, i) water and ii) mercury. The temperature of the liquid is 20°C and the values of the surface tension of water and mercury at 20°C in contact with air are 0.073575 N/m and 0.51 N/m respectively. The angle of contact for water is zero and that for mercury is 130°. Take density of water at 20°C as equal to 998 kg/m^3. **(05 Marks)**

2 a. Derive Pascal's law for the intensity of pressure at a point in a static fluid. **(06 Marks)**

b. Differentiate between: i) Absolute pressure and Gauge pressure ii) Simple manometer and differential manometer. **(06 Marks)**

c. A differential manometer is connected at the two points A and B of two pipes. The centre of pipe A is 3 m above centre of pipe B. Pipe A contains liquid of sp.gr. 1.5 while pipe B contains a liquid of sp.gr. 0.9. The manometric liquid mercury is 5 m below the centre of pipe A. The pressure at A and B are 1 Kgf/cm^2 and 1.8 Kgf/cm^2 respectively. Find the difference in mercury level in the differential manometer. **(08 Marks)**

3 a. Derive an expression for total pressure and centre of pressure for a vertical plane surface submerged in liquid. **(08 Marks)**

b. Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4 m and altitude 4 m when it is immersed vertically in an oil of sp.gr. 0.9. The base of the plate coincides with the free surface of oil. **(06 Marks)**

c. An inclined rectangular sluice gate AB, 1.2 m by 5 m size as shown in Fig. Q3(c) is installed to control the discharge of water. The end A is hinged. Determine the force normal to the gate applied at B to open it. **(06 Marks)**

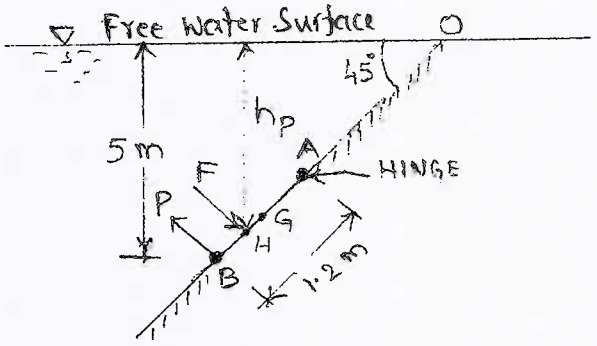

Fig. Q3 (c)

4 a. Define equation of continuity. Derive an expression for continuity equation for a three-dimensional flow. **(08 Marks)**

b. A Fluid flow field is given by,

$V = x^2yi + y^2zj - (2xyz + yz^2)k$

Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point (2, 1, 3) **(12 Marks)**

PART – B

5 a. Derive Euler's equation of motion. **(06 Marks)**

b. The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm^2, find the intensity of pressure at section 2. **(07 Marks)**

c. The inlet and throat diameters of a horizontal venturimeter are 30 cm and 10 cm respectively. The liquid flowing through the meter is water. The pressure intensity at inlet is 13.734 N/cm^2 while the vacuum pressure head at the throat is 37 cm of mercury. Find the rate of flow. Assume that 4% of the differential head is lost between the inlet and throat. Find also the value of C_d for the venturimeter. **(07 Marks)**

6 a. An oil of sp.gr. 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200 mm at the rate of 60 litres/s. Find the head lost due to friction for a 500 m length of pipe. Find the power required to maintain this flow. **(06 Marks)**

b. At a sudden enlargement of water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. **(08 Marks)**

c. Water is flowing through a horizontal pipe of diameter 200 mm at a velocity of 3 m/s. A circular solid plate of diameter 150 mm is placed in the pipe to obstruct the flow. Find the loss of head due to obstruction in the pipe if $C_C = 0.62$. **(06 Marks)**

7 a. Explain any five methods of measuring water depth with the help of neat sketch. **(10 Marks)**

b. Describe the area velocity method to measure discharge through a stream section. **(05 Marks)**

c. A pitot-static tube having a coefficient of 0.98 is used to measure the velocity of water in a pipe. The stagnation pressure recorded is 3 m and the static pressure 2 m. Determine the velocity. **(05 Marks)**

8 a. Explain the procedure to measure discharge using i) Triangular notch ii) Cipolletti notch iii) Orificemeter. **(12 Marks)**

b. A broad-crested weir of 50 m length, has 50 cm height of water above its crest. Find the maximum discharge. Take $C_d = 0.60$. Neglect velocity of approach. Also, if the velocity of approach is to be taken into consideration, find the maximum discharge when the channel has a cross sectional area of 50 m^2 on the upstream side. **(08 Marks)**

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10CV42

Fourth Semester B.E. Degree Examination, June/July 2015
Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting at least TWO questions from each part.*
2. Use of IS – 10262 – 2009 is permitted.

PART – A

1 a. What are the various laboratory tests conducted on cement? **(05 Marks)**
b. Explain the importance of conducting the soundness test on cement and the procedure of conducting the soundness test. **(10 Marks)**
c. Explain with the flow chart the manufacture of cement by wet process. **(05 Marks)**

2 a. Explain the importance of shape and texture of aggregate used in concrete. **(10 Marks)**
b. Which are various tests conducted on coarse aggregates for determining its strength? **(05 Marks)**
c. Explain bulking of aggregates. **(05 Marks)**

3 a. What is an admixture? What is the effect of air entrainment on the properties of concrete? **(12 Marks)**
b. Write short notes on accelerators and retarders. **(08 Marks)**

4 a. Define workability and list the factors affecting workability. **(08 Marks)**
b. List the various tests to measure workability and explain KEE BEE consistometer test. **(12 Marks)**

PART – B

5 a. What are factors affecting the strength of concrete? **(04 Marks)**
b. Explain the accelerated curing test on concrete cubes. **(08 Marks)**
c. Write short notes on Bond strength of concrete. **(08 Marks)**

6 a. Explain briefly the factors affecting modulus of elasticity of concrete. **(10 Marks)**
b. Discuss the factors affecting creep. **(10 Marks)**

7 a. Explain the different methods of controlling sulphate attack on concrete. **(10 Marks)**
b. Discuss the durability of concrete in sea water. **(10 Marks)**

8 Design a concrete mix by IS method for M30 grade concrete as per IS 10262 – 2009.
a) Grade : M30
b) Cement : OPC – 43 Grade
c) Maximum Nominal size of aggregate : 20mm
d) Minimum cement content : 320 Kg/m^3
e) Max. w/c Ratio : 0.45
f) Workability : 100mm slump
g) Exposure condition : severe (Reinforced concrete)
h) Method of concrete placing : pumping
i) Degree of super vision : Good
j) Type of aggregate : Crushed Angular
k) Max. Cement content : 450 Kg/m^3
l) Chemical admixture : Super plasticizer.

Test Data for materials:

i) Specific Gravity of cement : 3.15
ii) Specific Gravity of C.A : 2.74
iii) Specific Gravity of F.A : 2.74
iv) Water Absorption for
    1) C.A : 0.5%
    2) F.A : 1.0%
v) Free surface moisture
    1) C.A : NIL (Absorbed moisture also NIL)
    2) F.A : NIL
vi) Fine Aggregate conforms to grading zone – I
    1) of table 4 of IS 383
    2) Coarse Aggregate

IS sieve size (mm)	Analysis of coarse Aggregate fraction		% of different Fractions			Remarks
	I	II	I 60%	II 40%	Combined 100%	
20 10 4.75 2.36	100 0	100 71.20 9.40 0	60 0	40 28.5 3.7	100 28.5 3.7	Conforming To Table 2 of IS 383

(20 Marks)

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10CV43

Fourth Semester B.E. Degree Examination, June/July 2015
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. Distinguish between statically determinate and indeterminate structures with examples. **(08 Marks)**

b. Find degree of indeterminacy of following structure shown in Fig. Q1(b). **(06 Marks)**

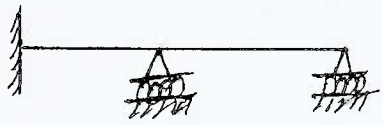

Fig.Q1(b)(i)

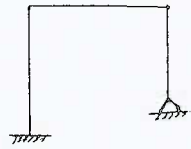

Fig.Q1(b)(ii)

Fig.Q1(b)(iii)

c. Derive an expression for strain energy stored due to bending. **(06 Marks)**

2 a. A cantilever beam of length 4 m is loaded as shown in Fig .Q2(a). Calculate the deflection and slope at free end by moment area method. Taking EI is constant. **(10 Marks)**

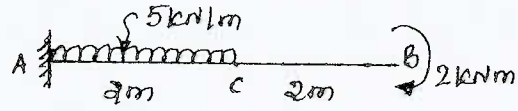

Fig.Q2(a)

b. For the beam shown in Fig. Q2(b). Determine slope at left support and deflection at 100 kN load, using conjugate beam method. **(10 Marks)**

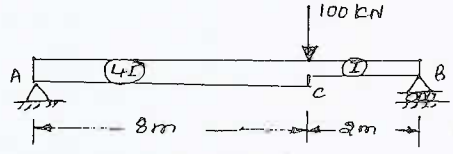

Fig.Q2(b)

3 a. Find the vertical deflection at C for the bent shown in Fig. Q3(a), by real work method [strain energy]. Take EI is constant. **(10 Marks)**

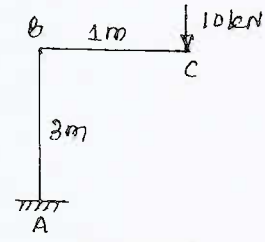

Fig.Q3(a)

b. Determine the deflection under 60 kN loads in the beam shown in Fig.Q3(b), by strain energy method. **(10 Marks)**

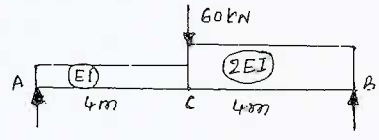

Fig.Q3(b)

4 a. Determine the reaction at prop for a propped cantilever beam carrying of UDL of w/unit length throughout span. Take EI is constant using strain energy method. **(08 Marks)**

b. Analyse the fixed beam by strain energy method and draw SFD and BMD. Shown in Fig.Q4(b). **(12 Marks)**

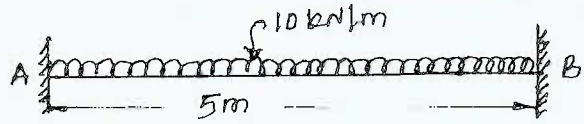

Fig.Q4(b)

PART – B

5 a. A three hinged parabolic arch has a span of 20 mts and rise of 5 mts. It carries a udl of 2 kN/m over the left half of the span and a point load of 12 kN at 5 mts from the right end. Find the BM, normal thrust and radial shear at a section 4 mts from left end. **(12 Marks)**

b. A cable is suspended between two points A and B 100 mts apart and a central dip of 8 mts. It carries udl of 20 kN/m. Find : i) length of the cable ii) maximum and minimum tension in the cable. **(08 Marks)**

6 a. Draw SFD and BMD for the propped cantilever beam loaded as shown in Fig. Q6(a). Using consistent deformation method. **(10 Marks)**

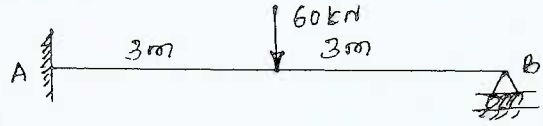

Fig.Q6(a)

b. Analyse the fixed beam shown in Fig.Q6(b). draw BMD and SFD by consistent deformation method. **(10 Marks)**

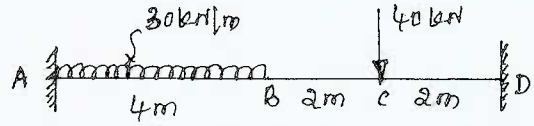

Fig.Q6(b)

7 Analyse the continuous beam shown in Fig.Q7, by Clapeyron's three moment theorem. Draw SFD and BMD. Take EI is constant. **(20 Marks)**

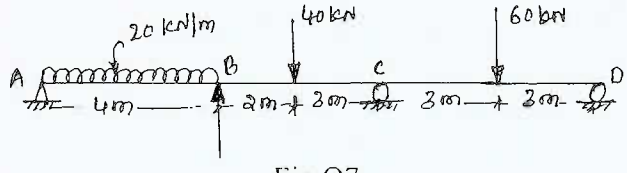

Fig.Q7

8 Find the horizontal thrust for the two hinged arch as shown in Fig.Q8. The moment of inertia at any section is $I_c \sec\theta$ where θ is the slope at section and I_c is MI at the crown. Neglect the effect of rib shortening. Draw BMD. **(20 Marks)**

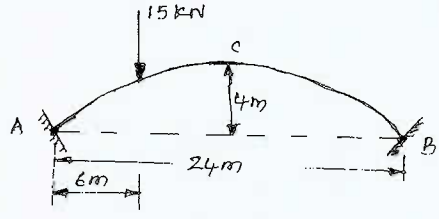

Fig.Q8

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10CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2015
Surveying – II

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Draw neat sketches.
3. Missing data, if any, may be suitably assumed.

PART – A

1 a. Explain the following terms with reference to theodolite :
i) transiting ii) swinging iii) line of collimation
iv) horizontal axis v) faceleft observation. **(10 Marks)**

b. With a neat sketch and tabular column, explain the measurement of horizontal angles by repetition method. List the errors that are eliminated by this method. **(10 Marks)**

2 a. What are the permanent adjustments of a theodolite? Explain the spire test. **(10 Marks)**

b. The following observations were made during the testing of a dumpy level

Instrument	Staff Reading on	
@	A	B
A	1.702	2.244
B	2.146	3.044

Distance AB = 1500 meters.
Is the instrument in adjustment? To what reading should the line of collimation be adjusted when the instrument were at B? If RL of A = 432.052 m, what should be the RL of B? **(10 Marks)**

3 a. What is a total station? List out the advantages of total station. **(04 Marks)**

b. Derive the expressions for the horizontal distance, vertical distance and the elevation of an object by double plane method, when the base is inaccessible **(08 Marks)**

c. In order to ascertain the elevation of the top(Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100 meters apart, the stations P and R being in line with Q. The angles of elevation of Q at P and R were 28° 42′ and 18°6′ respectively. The staff readings upon the benchmark of elevation 287.280 meters were respectively 2.870 and 3.750 m when the instrument was at P and R, the telescope being horizontal. Determine the elevation of the foot of the signal if the height of the signal above its base is 3 meters. **(08 Marks)**

4 a. Derive the expressions for distance and elevation when the staff is held vertical and the line of sight is inclined. **(10 Marks)**

b. Determine the gradient from a point A to a point B from the following observations made with a tacheometer fitted with an anallactic lens. The constant at the instrument was 100 and the staff was held vertically.

Instrument station	Staff point	Bearing	Vertical angle	Staff readings
P	A	134°	+10° 32′	1.360, 1.915, 2.490
	B	224°	+5° 6′	1.065, 1.885, 2.705

(10 Marks)

PART – B

5 a. What are the different methods of settingout a simple circular curve? **(04 Marks)**

b. Calculate the ordinates at 10 meters distances for a circular curve having a long chord of 80 meters and a versed sine of 4 meter. **(06 Marks)**

c. Two Tangents intersect at a chainage of 1000 meters, the deflection angle being 28° calculate all the data necessary to set out a simple circular curve of 250 mt radius by Rankine's method and tabulate the results. Peg interval = 20 mt; Least count of theodolite = 20 second. **(10 Marks)**

6 a. Draw a neat labeled sketch of compound curve and giving the elements of a compound curve. Explain the method of settingout compound curve. **(10 Marks)**

b. A compound curve consisting of two simple circular curves of radii 350 m and 500 m is to be laidout between two straights T_1I and T_2I. PQ is the common tangent, at point of compound curvature, D. The angles IPQ and IQP are respectively 55° ad 25°. Sketch and calculate the tangent lengths T_1I and IT_2. **(10 Marks)**

7 a. What is phase of a signal? Derive the expression for phase correction when the bright portion is bisected. **(10 Marks)**

b. From on eccentric stations 'S', 12.25 meters to the west of the main station B, the following angles were measured $\angle BSC = 76° 25' 32''$ and $\angle CSA = 54° 32' 20''$. The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5286.5 mt and 4932.2 m respectively. **(10 Marks)**

8 a. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 meters in the following order :

0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m

Calculate the area between the chain line, the curved boundary line and the end offset by :

i) Average ordinate rule
ii) Trapezoidal rule
iii) Simpson's rule. **(10 Marks)**

b. A railway embankment is 10 mt wide with side slopes 1½ to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 meters, the centre heights at 20 m intervals being in meters

2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5. **(10 Marks)**

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10CV45

Fourth Semester B.E. Degree Examination, June/July 2015
Hydraulics and Hydraulic Machines

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Assume missing data suitably.

PART – A

1 a. Explain the terms: distorted models and undistorted models. **(04 Marks)**

b. Explain Froude's model law. List its application in fluid flow problems. **(06 Marks)**

c. The resisting torque T against the motion of a shaft in a lubricated bearing depends on the viscosity μ, the rotational speed N, the diameter D and bearing pressure intensity P, show that $T = \mu N D^3 \phi\left[\frac{P}{\mu N}\right]$. **(10 Marks)**

2 a. What do you understand best hydraulic channel section? Derive the conditions for best hydraulic triangular channel section. **(10 Marks)**

b. A trapezoidal channel with side sloper of 3 horizontal to 2 vertical has to be designed to convey 10 m^3/s at a velocity of 1.5 m/s, so that the amount of concrete lining for the bed and sides is minimum. Find: i) The wetted perimeter; ii) Slope of the bed if Manning's n = 0.014. **(10 Marks)**

3 a. Derive the differential equation for gradually varied flow and list all the assumptions. **(10 Marks)**

b. A discharge of 18 m^3/s flows through a rectangular channel 6m wide at a depth of 1.6m. Find:
i) Specific energy head
ii) Critical depth
iii) State weather the flow is subcritical or supercritical
iv) What is the depth alternate to the given above? **(10 Marks)**

4 a. Derive the expressions for force exerted by a jet on an inclined plate in the direction of the jet. i) When the plate is stationary? and ii) When the plate is moving in the direction of jet? **(10 Marks)**

b. A jet of water of diameter 25mm strikes a 200mm × 200mm square plate of uniform thickness with a velocity of 10m/s at the centre of the plate which is suspended vertically by a hinge on its top horizontal edge. The weight of the plate is 98.1N. The jet strikes normal to the plate. What force must be applied at the lower edge of the plate so that plate is kept vertical? If the plate is allowed to deflect freely, what will be the inclination of the plate with vertical due to the force exerted by the jet of water? **(10 Marks)**

PART – B

5 a. Show that for a free jet of water striking at the centre of a symmetrical curved vane the maximum efficiency is slightly less than 60%. **(10 Marks)**

b. A jet of water having velocity 45m/s impinges without shock on a series of vanes moving at 15 m/s, the direction of motion of vanes being inclined at 20° to that of the jet. The relative velocity at the outlet is 0.9 of that at inlet, and the absolute velocity of the water at the exit is to be normal to the motion of vanes. Find: i) Vane angles at entrance and exit and ii) Hydraulic efficiency. **(10 Marks)**

6 a. Classify and explain different types of turbines. **(10 Marks)**

b. A penstock supplies water from a reservoir to the Pelton Wheel with a gross head of 500m. One third of the gross head lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is 2 m^3/s. The angle of deflection of jet is 165° when the vanes are stationary. Determine the power given by the water to the runner and also hydraulic efficiency. Take speed ratio = 0.45 and $C_V = 1.0$. **(10 Marks)**

7 a. What is draft tube? What are the functions of draft tube? **(06 Marks)**

b. With the help of a neat sketch, explain the component parts of Kalpan turbine. **(06 Marks)**

c. A Kalpan turbine produces 60000 kW under a net head of 25m with an overall efficiency of 90%. Taking the value of speed ratio as 1.6 and flow ratio as 0.5 and hub diameter as 0.35 times the outer diameter, find the diameter and speed of the turbine. **(08 Marks)**

8 a. Explain manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump. **(06 Marks)**

b. Describe with sketches pumps in series and pumps in parallel. **(06 Marks)**

c. A centrifugal pump running at 1450 rpm discharges 710 litres per second against a head of 23 metres. If the diameter of the impeller is 250mm and its width is 50mm find the vane angle at the outer periphery. The manometric efficiency of the pump is 75%. **(08 Marks)**

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10CV46

Fourth Semester B.E. Degree Examination, June/July 2015

Building Planning and Drawing

Time: 4 hrs. Max. Marks:100

Note: 1. ***Part A is compulsory and answer any Two full Questions from Part B***

2. ***Suitable data may be assumed whenever necessary.***

PART – A

1 The line diagram of residential building is given in Fig.Q1. Draw the following to a scale of 1:100.

a. Plan at sill level **(20 Marks)**

b. Front Elevation **(10 Marks)**

c. Sectional Elevation Through Section "PQRS". **(25 Marks)**

d. Shedule of opening. **(05 Marks)**

PART – B

2 a. Draw the front Elevation and sectional plan view of Half paneled and half Glazed window of size 1.2m × 1.5m. **(10 Marks)**

b. Draw plan and sectional Elevation of R.C.C Dog legged staircase for an office building which measures 3.0m × 5.5m. The Ver distance between floor is 3.3m (including landing). Thickness of the floor slab and landing slab = 150mm. Width of stair = 1.5m. **(10 Marks)**

3 Prepare working drawing of a Isolated footing of column size 350 × 500mm reinforced with 8 number of 12mm HYSD bars together with 8mm diameter tie (stirrups) at 150mm centre to centre. Tooting size is 2.0 × 2.5m. Effective depth 500mm at the face of column to 150mm at tip. The footing Reinforced compriser of 12mmϕ HYSD bars at 150mm centre to centre both ways.

a. Sectional elevation of column with footing. **(10 Marks)**

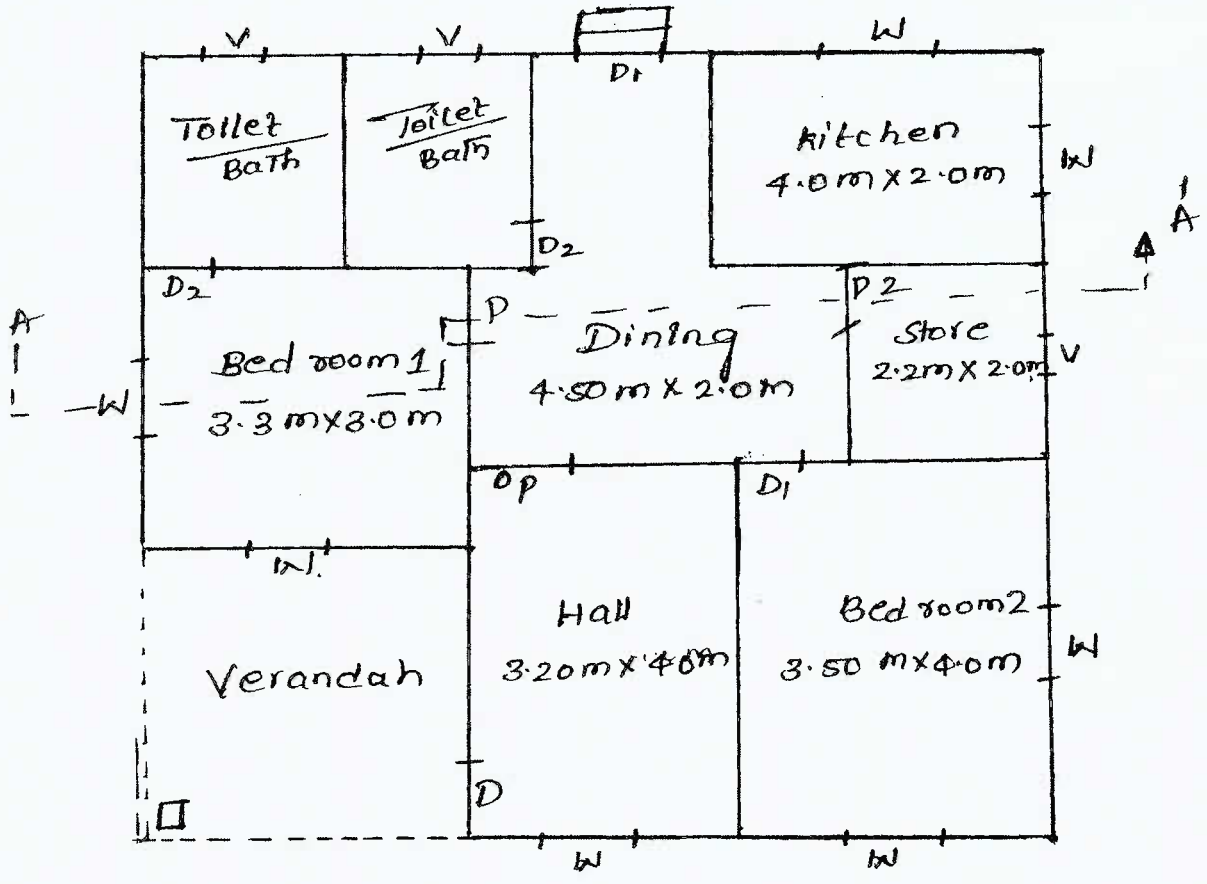
b. Sectional plan of column and footing. **(10 Marks)**

4 Prepare a Bubble diagram (connectivity diagram) of college canteen and develop a single line diagram based on the bubble diagram (to a suitable scale)

1) Dining area for Boys and Girls separately
2) Kitchen
3) Juice Corner
4) Snacks Corner
5) Dining arc for staff
6) Store for kitchen
7) Utilities attached to kitchen
8) Eland Washing
9) Cash Counter

The student strength of college is 2500. **(20 Marks)**

5 The line diagram of a Residential building is shown in Fig (Q.5) prepare water supply connection and sanitary connection with usual notations. (Assume Road direction) and road to the site as shown in Fig.Q5. **(20 Marks)**



(Fig. Q1 and Q5)

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10CV43

Fourth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define the following:
i) Linear and non-linear systems.
ii) Geometric and material non-linearity. **(06 Marks)**

b. Explain the principle of minimum potential energy. **(05 Marks)**

c. Explain determinate and indeterminate structures with suitable examples. **(05 Marks)**

d. Find the statical and kinematic indeterminancy for the following structures: **(04 Marks)**

Fig.Q.1(d)(i)

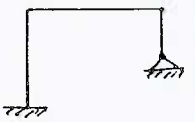

Fig.Q.1(d)(ii)

2 a. Determine the rotation and deflection at the free end of a cantilever beam shown in Fig.Q.2(a), by moment area method. Take EI = constant. **(10 Marks)**

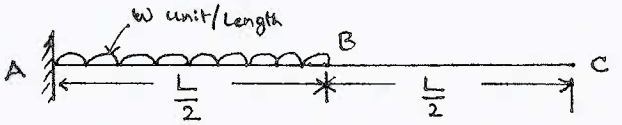

Fig.Q.2(a)

b. Determine the maximum slope and deflection for the given simply supported beam as shown in Fig.Q.2(b), by conjugate beam method. **(10 Marks)**

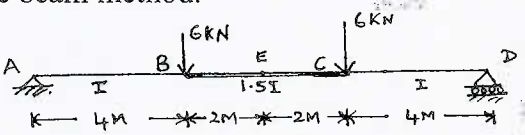

Fig.Q.2(b)

3 a. State Clark Maxwell's law of reciprocal deflection. **(02 Marks)**

b. Determine the vertical deflection at 'C' for the beam shown in Fig.Q.3(b), by Castigliano's method. **(09 Marks)**

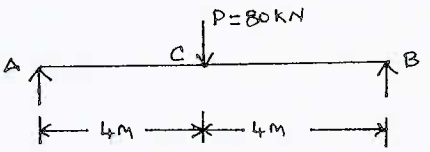

Fig.Q.3(b)

c. Determine the rotation at the free end of a cantilever beam shown in Fig.Q.3(c), by Castigliano's method. **(09 Marks)**

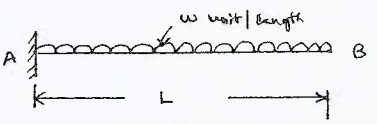

Fig.Q.3(c)

4 a. Find the vertical deflection at 'C' for the beam shown in Fig.Q.4(a), by strain energy method. **(08 Marks)**

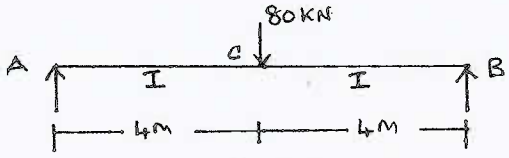

Fig.Q.4(a)

b. Determine the vertical deflection at 'C' for the frame loaded as shown in Fig.Q.4(b), by using unit load method. Cross sectional area of horizontal, vertical and inclined members are 1500, 2000 and 4000mm^2 respectively. Take EI = 2.1×10^5 N/mm^2. **(12 Marks)**

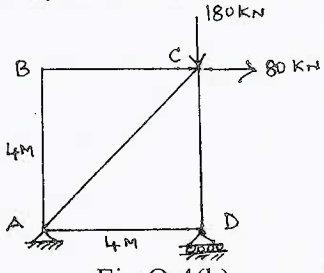

Fig.Q.4(b)

PART – B

5 A three hinged parabolic arch of span 24m, rise 6m with hinges at abutments and at crown point. Arch is subjected to a point load of 50kN and 150kN at a distance of 8m and 20m from left support. Determine:

i) Reaction at supports.
ii) Resultant reaction and its inclination at supports.
iii) Bending moments at load points and draw BMD.
iv) Normal thrust and radial shear at a distance of 6m from left and right supports.

(20 Marks)

6 A beam AB of span 4m is fixed at A and B carries a point load of 5kN at a distance of 1m from end A. Calculate the support reactions by the method of consistent deformation. Also draw BMD and SFD. Take EI = constant. **(20 Marks)**

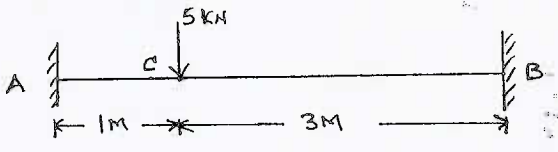

Fig.Q.6

7 Analyze the continuous beam by three moment equation. Find reactions and draw BMD and SFD. **(20 Marks)**

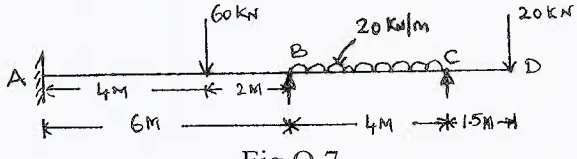

Fig.Q.7

8 A parabolic two hinged arch has a span of 32m and a rise of 8m. A uniformly distributed load of 1kN/m covers 8m horizontal length of the left side of the arch. If $I = I_0 \sec\theta$, where θ is the inclination of the arch of the section to the horizontal, and I_0 is the moment of inertia of the section at the crown. Find out the horizontal thrust at hinges and bending moment at 8m from the left hinge. Also, find out normal thrust and radial shear at this section. **(20 Marks)**

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10CV44

Fourth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Surveying – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the following terms with reference to a theodolite (i) Transiting (ii) Swinging (iii) Line of collimation (iv) Centering (v) Vertical axis. **(10 Marks)**

b. Describe the method of measuring horizontal angle by repetition method. What are the errors that are eliminated by repetition method? **(10 Marks)**

2 a. What are the fundamental lines of a transit theodolite? State the derived relationships between them. **(10 Marks)**

b. Explain the object, necessity, test and adjustment of making the horizontal axis perpendicular to the vertical axis of a theodolite by "SPIRE TEST". **(10 Marks)**

3 a. Explain the method of finding the reduced level of the top of the given object, when base is inaccessible by double plane method. **(10 Marks)**

b. In order to ascertain the elevation of the top (Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100 meters apart, the stations P and R being in line with Q. The angles of elevation of Q at P and R were 28° 42′ and 18° 6′ respectively. The staff reading upon benchmark of elevation 287.280 were respectively 2.870 and 3.750 when the instrument was at P and R, the telescope being horizontal. Determine the elevation at the foot of the signal if the height of the signal above its base is 3 meters. **(10 Marks)**

4 a. With usual notation, derive the distance and elevation formulae for staff vertical and line of sight inclined upwards in fixed hair method of tacheometric surveying. **(10 Marks)**

b. A tacheometer was setup at a station 'A' and the reading on a vertically held staff at B were 2.255, 2.605 and 2.955. The line of sight being at an inclination of +8° 24′. Another observation on the vertically held staff at B.M gave the readings 1.640, 1.920 and 2.200, the inclination of the line of sight being +1° 6′. Calculate the horizontal distance between A and B, and the elevation of B if the RL of BM is 418.685 meters. The constants of the instruments were 100 and 0.3. **(10 Marks)**

PART – B

5 a. Explain the method of setting out a simple curve by Rankine's method of deflection angles. **(10 Marks)**

b. Two tangents intersect at a chainage of 1000 mt, the deflection angle being 28°. Calculate the necessary data to setout a simple curve of Radius 250 mt by Rankine's method and tabulate the results. Peg interval = 20 mt; Least count of theodolite = 20″. **(10 Marks)**

6 a. A compound curve consisting of two simple circular curves of radii 350 mt and 500 mt is to be laidout between two straights T_1I and IT_2. PQ is the common tangent, at point of compound curvature, D. The angles IPQ and IQP are respectively 55° ad 25°. Sketch and calculate the tangent points T_1I and IT_2. **(10 Marks)**

b. From an eccentric station S, 12.25 meters to the west of the main station B, the following angles were measured: $\underline{BSC} = 76° 25' 32''$

$\underline{CSA} = 54° 32' 20''$

The stations S and C are to the opposite sides of the line AB, calculate the correct angle ABC if the lengths AB and BC are 5286.5 and 4932.2 mt respectively. **(10 Marks)**

7 a. What is a Transition curve? List the functions and conditions to be fulfilled by a transition curve. **(10 Marks)**

b. A road bend which deflects 80° is to be designed for a maximum speed of 100 kmph, a maximum centrifugal ratio of ¼ and a maximum rate of change of acceleration 30 cm/sec^2, the curve consists of a circular arc combined with two cubic spirals. Calculate : i) the radius of the circular arc ii) the requisite length of transition iii) the total length of the composite curve and iv) chainages of beginning and end of transition curve, and of the functions of the transition curve with the circular arc, if the chainage of PI is 42862 meters. **(10 Marks)**

8 a. The following perpendicular offsets were taken at 10 mt intervals from a survey line to an irregular boundary line.

3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65

Calculate the area enclosed between the survey line, the irregular boundary line and the first and last offsets, by the application of (i) average ordinate rule (ii) Trapezoidal rule and (iii) Simpson's rule. **(10 Marks)**

b. A road embankment is 10 mt wide with side slopes ½ to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 meters, the centre heights at 20 m intervals being in meters

2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5 **(10 Marks)**

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